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## WASHINGTON LETTER.

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WASHINGTON, JUNE 21, 1897.

APPROPRIATIONS.—The large appropriation bills left over from the last Congress have finally been passed, the one of chief interest from the standpoint of surveys and exploration—the Sundry Civil—being approved by the President on June 4. This enables the various organizations engaged in the prosecution of field work to present their plans and begin to put them into immediate execution. Chief among these are the Coast and Geodetic Survey, the Geological Survey with its various branches, the General Land Office and the Smithsonian Institution.

Under the Coast Survey there will be carried on during the summer the usual mapping of shore line and harbors on the Atlantic, Gulf and Pacific coasts, and in addition to this explorations in the waters of Alaska, including survey of the Aleutian Islands and examination of the mouth of Yukon River. The Trans-Continental line of precise levels has been taken up at a point in western Kansas near Hays and will be continued along the line of the Kansas Pacific Division of the Union Pacific Railroad westerly into Colorado, connecting probably with some of the points whose elevations have been determined by the vertical angles of the Trans-Continental triangulation. This latter has been practically completed, but a considerable amount of field work remains to be done in check determinations.

GEOLOGICAL SURVEY.—During the coming year the appropriation for this Survey and its various branches reaches the high-water mark of nearly \$970,000. The increase is due mainly to sums for surveys carried on in the subdivision and topographic mapping of the Indian Territory and for work connected with the examination of the forest reservations. The principal items are for topography \$175,000; for geology \$100,000; for map publication \$60,000; for forest reservation surveys \$150,000; hydrographic surveys \$50,000; Indian Territory \$100,000; and resurveys of lands of the Chickasaw Nation \$141,500. The amount of \$5,000 has been appropriated for examination of the mineral resources of Alaska, but this sum becomes available so late in the season that it will be impracticable to take up work during the coming summer.

Geologic work is, as in past years, widely distributed, typical

or important areas being under examination in nearly every State and section from New England to California. The economical features are made prominent, considerable attention being devoted to the coals of the Appalachian area, the iron ores of Lake Superior, the precious metals of the Rocky Mountain region and Pacific Coast and to the mineral wealth and building stones of all localities. Plans and operations are so directed that the results of the field work can be shown in general in the series of geologic atlas folios. In some cases, however, monographic studies are being conducted, such as that in hand by Dr. C. Willard Hayes for the southern Appalachian area considered as a whole in its physiography and geology.

**TOPOGRAPHIC SURVEY.**—The topographic parties of the Geological Survey have begun active work in nearly all the States. In the East the larger proportion of new maps will be those in New York, where co-operation with the State Engineer and Surveyor promises the early completion of the entire area. The area of at least three fifteen-minute sheets will be surveyed in the Adirondacks, the titles of these being, respectively, Indian Lake, Fulton Chain, and Wil-murt. In the western and central part of the State it is proposed to finish the Brockport, Hamlin, Onondaga, Cazenovia, and Salamanca sheets, while the changes in and around Greater New York necessitate the revision of the maps, the surveys for which were made nearly ten years ago. The area will be increased easterly by surveying the Oyster Bay and Hempstead sheets.

The plans outlined and already under execution enumerate a long series of States in which surveys are being conducted, not only in the Appalachian area, but also in the Mississippi Basin and far West. In the Vermillion iron district of Minnesota a strip of country will be contoured, also areas mapped adjacent to those already surveyed in the Dakotas, Kansas and Nebraska. In the vicinity of Chicago a revision will be made to show recent changes and additional work done both in the State of Illinois and in southerly Indiana. In Washington mapping will be continued, also in Oregon south of Coos Bay, and in Nevada near Silver Peak. In southern California it is proposed to complete a thirty-minute sheet south of Redlands and San Bernardino; in the vicinity of Denver triangulation will be continued northerly toward Greeley, affording control points for the completion of the large Denver map and for its extension along the thickly settled portions of the South Platte drainage.

**HYDROGRAPHIC SURVEY.**—The Division of Hydrography of the United States Geological Survey has begun active field work in the

measurement of surface streams and examination of sources of underground water. The river stations in various parts of the United States are being inspected, and measurements of spring floods obtained wherever practicable. In the East the principal river stations are along the Appalachians and near the fall line of the rivers extending from Pennsylvania southeasterly to Georgia and Alabama. In the West the observations are maintained principally for the purpose of ascertaining the water supply for irrigation, and the river stations are on the rivers coming from the Rocky Mountains and from the Sierra Nevada and Coast ranges. In Idaho, Oregon and Washington the number of river stations is being notably increased, owing to the demand for information bearing upon the development of new irrigation systems.

The results of operations of this hydrographic survey are shown in two series of publications; first the annual report forming a volume of the annual report of the Director of the Geological Survey, and, second, in pamphlets entitled "Water Supply and Irrigation Papers." The report for the last year's operations has just been sent to the Public Printer as Part III of the Eighteenth Annual Report of the Geological Survey. It is devoted for the most part to results of measurements and computations of the discharges of the streams during 1896. This is accompanied by a number of papers relating to the hydrography of particular areas. One of these is by Mr. Frank Leverett on the well waters of Indiana and Ohio, their character and mode of occurrence; another is by Mr. N. H. Darton on the artesian supply of South Dakota and its utilization, and a third by Mr. Robert T. Hill on the deep waters in the vicinity of San Antonio, Texas. There is also a profusely illustrated paper by Mr. James D. Schuyler on water storage and conservation of floods.

In the Water Supply and Irrigation series six papers are in print and six more in preparation. Most of these contain descriptions of the geography, geology and related hydrography of certain localities. The last paper (No. 12) gives a discussion of the Valley of Platte River in Nebraska and of adjacent areas, and is accompanied by a map which shows by conventional tints the depth from the surface to the water-bearing strata.

FOREST SURVEYS.—The Sundry Civil Act, approved, as noted above, on June 4, 1897, contains an appropriation of \$150,000 for the purpose of surveying forest reservations and determining their boundaries. The work will be done by the Geological Survey under regulations approved by the Secretary of the Interior. This

sum, although not sufficient for the complete mapping of the reservations, will probably suffice for the determination of the boundaries of some of the more important, especially of those from which supplies of timber are being drawn for mining purposes. It will be necessary to run out the exterior boundaries, following the conventional Land Office rectangular lines, and to occasionally locate some of the principal township and other corners within the reservation. Where considerable tracts of agricultural land, aggregating, say, a quarter of a township, or nine or ten square miles, lie within the exterior borders, it is probable that these areas will be sectionized; where, on the contrary, the land is extremely rough, triangulation points will be occupied, and the approximate location of township and ranges determined from these. The lines and points thus determined upon the ground will serve as part of the control for the topographic map, which will ultimately be made on a scale of two miles to the inch, showing the relief of the country and the cultural features, these maps being similar in appearance to the others now being issued by the Geological Survey.

In addition to the location of boundaries and the preparation of topographic sheets, a study of the character and value of the timber will be made, sufficient to determine in a general way the value of the forest in furnishing supplies of wood or as aiding in the conservation of waters. While the precise method of this examination has not been developed, it is probable that it will be done in a manner comparable to that of the timber cruising for timber companies, in which skilled men provided with light camping outfit traverse the country and estimate the stumpage. For the immediate purposes of the Government such an examination, carried on by skilled and intelligent men, will suffice and may form the basis for an administrative system. This latter has not been determined upon, but may be developed as one of the divisions of the General Land Office, the matters of surveying and mapping being left to the Geological Survey.

As far as practicable the results of the examination of the forest reserves will be shown upon maps, so that a clear, comprehensive view can be had of the whole matter. For this purpose the outlines of the wooded or forested areas will be shown in a manner similar to those of the forested areas of Connecticut and of the White Mountains, the maps of which have been issued by the Geological Survey. It is proposed to show the commercial character of the timber by varying tints of color, following some predetermined scale, so that the average number of feet, board measure, per acre

can be seen at a glance from the color of any particular area. In certain localities, as, for example, the Black Hills, it will be advisable to show also by a system of coloration of the map the distribution of important species of forest trees.

**BIOLOGICAL SURVEY.**—The Biological Survey of the Department of Agriculture under the charge of Dr. C. Hart Merriam has begun field work in various parts of the West with a number of field parties, particular attention being given to the States of Oregon and Washington. It is hoped that the results of this year will complete the preliminary work for these areas, and that two seasons more will practically finish the biologic map of the United States. A large amount of detailed work must of necessity be done, but the broad facts will probably be outlined by that time. A reconnoissance to finish an incomplete area is being made in the Boston Mountains in Indian Territory, and other field parties are examining the area near Pendennis, Kansas, and Valentine, Nebraska. Later work will be taken up in Salt Lake Basin along the Wasatch Range, and in Nevada from Carson Valley across to Tahoe and Donner lakes. Mr. Bailey, in general charge of the field work, is carrying the survey from Klamath Falls to Honey Lake, and another party has begun at Neah Bay, Washington, with the intention of working east and finally across the Cascade Range.

One problem of particular interest has been to trace the path by which the Sonoran fauna and flora progressed northerly from Nevada to the plains of the Columbia. Last season the Sonoran zone was traced northward to the vicinity of Klamath Lake, and it was at first inferred that this route extended to the north. Subsequent examination, however, showed the outlet in this direction to be cut off by high land, and that the Sonoran in this locality was merely a peninsula or outlying finger. The true outlet to the north was found to be through Alvord Desert to the east of Stein Mountain, this depression being the deepest in eastern Nevada. The Sonoran flora coming from the south up Quinn Valley passes over Alvord Desert and thence northerly by way of the valley of Malheur Lake. As data for the biologic map accumulate it is gratifying to note with what remarkable exactness one group of facts supports the deductions made from another. The matter has been put to severe tests by the construction of maps of the distribution of varieties of cereals, the data being collected and compiled independently of work done by the Biologic Survey. The life zones thus outlined coincide in every particular with those based

upon varieties of birds or animals, demonstrating that the laws governing the distribution of life are general in their operation.

The practical value of an accurate biologic map can scarcely be overestimated. It indicates that in certain zones various plants and animals cannot be expected to thrive. Guided by it the intelligent farmer should be saved expenditure of time and money in making experiments upon crops, where the environment is wholly unsuited to them. On the other hand it will indicate the areas subject to the ravages of destructive insects and similar pests, and also those that are exempted by their climatic conditions. In the matter of seed distribution it would be possible from the study of the biologic map to accomplish great economies, in preventing the sending of seeds of certain varieties to Congressional districts where the chances of growth are wholly against them.

BUREAU OF ETHNOLOGY.—The summer operations of this Bureau of the Smithsonian Institution include a further exploration of northern Arizona by Dr. J. Walter Fewkes, and work among the Kiowas of southern Oklahoma by Mr. James Mooney. The main energies of the Bureau are being devoted, however, to a completion of reports of results obtained during previous years, the attempt being made to present for publication a large amount of accumulated material. One of the largest pieces of work well under way is an encyclopædia of native Indian races, giving in as succinct form as possible a description of the various stocks and tribes, with their location, history, distinguishing traits and ethnic features. This work was begun originally as a dictionary of Indian names, but has grown in the making to a completeness which justifies its being considered encyclopædic in character.

Another project of geographic interest nearing completion is a report upon the land cessions to Indian tribes made since the origin of the Government. This includes schedules and maps giving the boundaries of the reservations at various periods. Many of these lines laid down in early days have governed the final location of State boundaries, and have thus become of great importance.

GEOGRAPHIC MODELS.—The project for a large model of the United States, upon a scale of about a foot to the mile, has been revived by Senator Cannon of Utah. He has reintroduced his joint resolution of last session, and is confident of its favorable consideration in committee and early passage by the Senate and House. This resolution provides merely for the creation of a commission of five to examine into and report to Congress upon the practicability,

advisability and cost of establishing near the City of Washington a ground map on such a scale as may be possible of construction upon the Potomac Flats, this map to reproduce in earth or other material the relief of the country, and upon this to be represented the forests, lakes, streams, towns, and other cultural features. It so happens that the Potomac Flats, which lie west of the Washington Monument and south of the White House, have a general outline similar to that of the whole country, and in other respects are adaptable for this purpose. The project for the appointment of this commission has been endorsed by prominent men and scientific organizations. A report upon the feasibility of the project will, if thoroughly prepared, be a valuable addition to geographic literature in discussing the value of models in geographic instruction, the methods of making these, and the results attained in various countries. Interest has been stimulated by the reports of large models now being constructed in Paris for the Exposition, and also of relief maps made in Japan. A considerable body of information is doubtless available, and if brought together may be of service in constructing models for use, not only in schools, but in general public instruction.

The New York State model, prepared primarily for the Museum at Albany, has been completed by Howell, and although on a small scale—twelve miles to an inch—enables one to form an excellent conception of the topography of the State as a whole. It is a matter of surprise to a person who has spent years in the study of geography and who is thoroughly familiar with a country or locality to discover how many new ideas are at once suggested by a comprehensive and carefully prepared model of what he has considered a well known area. The relative proportions of masses of mountains and of other general features often suffer a wonderful alteration when the accurately prepared model is studied. Besides the map of the State the relief map of Greater New York and vicinity has been completed from the combined topographic sheets of the Geological Survey. This offers many points of striking interest, especially in the ridges of the Palisades of the Hudson and in the broad marshes and lowlands near the harbor.

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